

CLAIMS

1. A combination (10) of a hydrocarbon fuel to hydrogen reformer of the exothermic type using fuel and oxygen from the ambient air to produce hydrogen reformate and an integrated heat exchanger, comprising,
 - 5 a substantially cylindrical reformer (12) having an interior reaction chamber (18) containing a fuel injector (26), an igniter (28) and a catalyst bed (30) within which chamber (18) hydrogen reformate is exothermically formed in reaction with ambient air, said reformer (12) also having an ambient air manifold space (24) surrounding said reaction chamber (18) that admits air into said reaction chamber (18), and,
 - 10 a substantially cylindrical heat exchanger (14) substantially coaxial to said reformer (12), adjacent at one end to said reformer (12) and structurally joined therewith, said heat exchanger (14) having axially extending reformate passages (42) and coextensive, nested ambient air passages (44) arrayed in mutually heat conductive fashion, said reformate flow passages (42) being open at one end to the reaction chamber (18) and open at the opposite end to a reformate exit port (56) from said heat exchanger (14), said air flow passages (44) being open at one end to said reformer manifold space and open at the opposite end to ambient air,
 - 15 whereby, oxygenated ambient air entering the ambient air passages (44) moves in one axial direction, into the reformer manifold space (24) and into the reaction chamber (18) to create hydrogen reformate, said reformate concurrently moving axially in the opposite direction out of said reaction chamber (18) and through said heat exchanger reformate passages (42), in continuous heat exchanging relationship, with said oppositely flowing ambient air, across said conductive fin (38) over substantially the entire axial length of said heat exchanger (14), so that said ambient air is continually warmed before reaching the reaction chamber (18), and the reformate is continually cooled before exiting the heat exchanger (14).

2. A combined (10) reformer and heat exchanger according to Claim 1, further characterized in that,

5 said reformatte passages (42) and air passages (44) are formed by concentric, inner (32) and outer (34) walls between which a continuous, corrugated, heat conductive fin (38) is contained.

3. A combined (10) reformer and heat exchanger according to Claim 2, further characterized in that,

5 said manifold space (24) has an outer wall (22) integral with said heat exchanger outer wall (34).

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4. A combined (10) reformer and heat exchanger according to Claim 3, further characterized in that,

5 said heat exchanger (14) is abutted with a generally cylindrical and coaxial secondary heat exchanger (16) of similar construction having an inner wall (66) integral with the inner wall (32).